



PETRO

HIGHER PRODUCTIVITY CROPS FOR BIOFUELS

PROJECTS:	10	FUNDING YEAR:	2011
TOTAL INVESTMENT:	\$36.3 million	PROGRAM DIRECTOR:	Dr. Jonathan Burbaum
PROJECT DETAILS:	www.arpa-e.energy.gov/ProgramsProjects/PETRO.aspx		

PROGRAM

The 10 projects that comprise ARPA-E's PETRO program, short for "Plants Engineered to Replace Oil," aim to develop non-food crops that directly produce transportation fuel. These crops can help supply the transportation sector with agriculturally derived fuels that are cost-competitive with petroleum and do not affect U.S. food supply. PETRO aims to redirect the processes for energy and carbon dioxide (CO₂) capture in plants toward fuel production. This would create dedicated energy crops that serve as a domestic alternative to petroleum-based fuels and deliver more energy per acre with less processing prior to the pump.

INNOVATION NEED

Worldwide, the supply of petroleum is decreasing as the demand for it is increasing. As the forces of supply and demand contribute to volatility in fuel prices, the availability of cost-effective, large-scale and renewable substitutes remain limited. As we continue to burn petroleum as our primary source of fuel for the transportation sector, greenhouse gases released into the atmosphere contribute heavily to global climate change.

The PETRO program seeks to genetically engineer a whole new class of crops that produce fuels which can be extracted directly from the plants themselves. Current biofuels production is limited by both the inefficient capture of solar energy by plants and the inefficient processes they use to convert CO₂ from the atmosphere into fuels we can use. PETRO projects are experimenting with various plants—including pine trees, tobacco, sugarcane, and sorghum—to create molecules already found in petroleum-based fuels that can be dropped directly into the tanks of existing vehicles. PETRO biofuels would provide a stable, economically viable alternative to petroleum that limits the environmental impact of the transportation sector.

PETRO PROGRAM GOALS

- Reduce biofuel production costs by up to 50%
- Increase energy yields per acre of land
- Recycle atmospheric CO₂

POTENTIAL IMPACT

If successful, PETRO's projects will create biofuels that can replace petroleum-based fuel for cars and planes at a competitive cost. Because plants absorb as much CO₂ as they release when used as fuel, net impact on the environment is zero.

- **SECURITY:** The transportation sector accounts for nearly all of our petroleum imports. Providing an advanced biofuel alternative to petroleum will allow the U.S. to reduce or eliminate these imports, improving our national security.
- **ENVIRONMENT:** More than 25% of all greenhouse gas emissions in the U.S. come from the transportation sector. Because plants naturally absorb CO₂, the amount they release when used as fuel adds zero net greenhouse gas emissions to the atmosphere.
- **ECONOMY:** The U.S. imports nearly \$1 billion in petroleum each day, accounting for the single largest factor in our trade balance with the rest of the world. Biofuels can be produced domestically, allowing us to keep more dollars at home.
- **JOB:** A self-sustaining biofuels industry that is cost-competitive with oil is well-positioned to see job growth in the agricultural, engineering, and research sectors.